FLAT-ROOF INSPECTION, *with a Focus on* Modified Bitumen

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Because of the costly damage they can cause, roof leaks surely top the list of home inspectors' liability concerns. This is especially true when inspecting flat or low-sloped roofs.

My roofing experience began more than 30 years ago; my father and grandfather were both roofing contractors, so I practically grew up installing and repairing roofs. Now, 30 years later, with thousands of roofs under my belt, the task of accurately reporting or determining the cause of a leak in a low-sloped roof can still be challenging. After being called on numerous times as a consultant in litigation between homeowners and roofing contractors or regarding home inspection complaints, I wrote this article with the hope it will help ASHI members with these challenges, thereby better serving their clients.

The types of low-slope roofing seem endless: asphalt built-up, EPDM, PVC, Modified Bitumen and TPO, to name a few. Much of the information in this article could be applied to all low-slope roofing; however, the focus is on a worthy material called Modified Bitumen (MB) and on its residential use. Please note: Specifications and details vary from manufacturer to manufacturer, as well as for specific material types and for commercial use. This article is intended as a general guide for home inspectors — not an exhaustive reference. And, additional information covering flashing and general concerns will be published next month in the March *Reporter.*

What is Modified Bitumen?

Unlike and not to be confused with asphalt roll roofing, Modified Bitumen (MB) membranes are tough and resist tearing. When correctly installed, they make a reliable roof. To the contrary, asphalt roll roofing is thinner than MB, easily torn and the application usually involves nails and roof cement. An MB membrane is reinforced with fiberglass, polyester or a combination of the two, which gives it strength; puncture resistance and overall system integrity. The asphalt (bitumen) is the waterproofing element, which has been modified (or improved) with Polymers. The membrane can be surfaced with mineral granules or metal foil in a variety of colors or left unsurfaced (smooth). MB is often referred to as rubber or a rubberized roof, but it is important for a home inspector to know it is not the same as an EPDM (rubber) roof.

A variety of Polymer blends is available. For residential use, the two most common modifiers are: Styrene-butadiene-styrene (SBS) and Atactic polypropylene (APP).

- **SBS polymer** gives the asphalt a rubber-like characteristic. Known to have good flexibility in cold temperatures, it's more sensitive to UV radiation than APP. Usually, it's applied with hot asphalt: however, it can be applied using a cold adhesive. To prevent premature deterioration from UV radiation, granules similar to those found on shingles or metal foils are used to surface this type of membrane.

- **APP polymer** is known to perform better in hot weather applications, and it is more resistant to UV radiation than SBS. It's usually applied with a torch (heat-welded); however, some manufactures have cold adhesives available. APP is usually an unsurfaced (smooth) material, but there are granular-surfaced versions available. It is generally recommended that unsurfaced membranes be painted with a reflective paint to increase its resistance to UV radiation. It is my experience that this greatly increases the life of the roof.

On homes, the membrane is usually single-ply, although multi-plies can be installed.

An inspector could make some general assumptions about the type of MB; however, I recommend simply describing it as MB. It's difficult to differentiate types once they're installed.

Several manufacturers have introduced self-adhering (peel and stick) versions of MB over the past 10 years. This article does not address this type, but it is important to know they are out there. They have the same basic installation details and defects as other types. I have seen peel-and-stick versions used to repair built-in gutters, as well as entire roofs. From experience, I believe their ability to adhere depends on the condition of the surface, including how well it was cleaned. Like tape, self-adhering MB will not stick to dirt, rust, etc.

THE INSPECTION

Where to start

The goal of a roof inspection is to identify the following:

- roofing materials,
- deficiencies,
- roof components that are not functioning properly, and
- components that are near the end of their expected service life.

All successful inspectors have their own roof inspection protocols. I recommend starting from below, as follows.

While on the ground, carefully view any perimeter edge flashing, noting any irregular appearance that deserves a closer evaluation once on the roof.

On a masonry home, note any efflorescence along the top of exterior walls, which could be related to a roof leak, or any masonry deterioration that could contribute to a roof leak.

Prior to getting on the roof, thoroughly inspect interior ceilings, walls and attics for evidence of leakage and/or damage. Signs of a leak on a ceiling don't mean the roof is leaking directly overhead. Often, flat roofs have layers such as base sheets, more than one ply, old roof, rigid insulation or metal decking. The leak may originate in one spot and zigzag down until it finds the path of least resistance before it shows up, often many feet away. On a metal deck, for example, it is possible that water entered on the front high side of the home and trailed down the metal to the rear low side before it found its way down to stain a ceiling. Experienced roofers hired to locate and repair leaks always determine the type of roof decking, asking whether the leak showed during the rain or sometime after. This information helps them find the leak.

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What about Structure?

Structural defects can affect roof performance. Often, I find residential additions with inadequate flat roofs. The once-flat roof has deflected downward several inches into the shape of a bowl, causing cracks and noticeable bowing in the interior ceiling. If it's a drop ceiling, you can see the bottom side of the structure by removing the ceiling tiles. The decking should not be rusted (if metal); even slight rust should be reported and further evaluated. Rusty roof decking can be an indication of high humidity in the building; but more often indicates faulting roofing. What appears to be surface rust on the underside of metal decking can actually be significant damage, so be careful walking on a rusty metal deck.

As we focus on MB, please be aware there are many structural issues and roof deck materials not covered in this article.

Why walk the roof?

Opinions differ on whether to walk on roofs, but I don't know how anyone can adequately inspect a flat roof without walking on it. When inspecting any roof, always err on the side of safety, always know where you are on the roof and never walk backwards. As you walk around inspecting the roof, pay close attention to how it feels underfoot. Often, rigid insulation is found with MB roofs, although it is less common on homes than in commercial buildings. It is impossible to visually detect wet insulation, and it's difficult to detect it from feel. A sunken or spongy-feeling area may indicate the insulation is wet and damaged. Sometimes, you can hear the sound of water squishing, or you may see water squirt out from the membrane when pressure is applied. Be careful not to step on blisters or anything else that could damage the roof. ▶▶▶

Inspecting Roofs: Steep vs. Low-Slope

When inspecting a low-slope roof, it's important to remember that unlike steep roofing, which relies on water shedding to keep water out, low-slope roofing must be completely waterproof. We've all seen deteriorated shingle roofs that continue to shed water because the slope and overlapped shingles keep the water moving down and off the roof. In contrast, on a low-sloped roof, the smallest hole or slightest installation error can result in significant leaking. A small hole on a steep roof might mean a ceiling stain or a few drips; a small hole on a flat roof could cause a water fall, collapsed ceilings, ruined floors, etc.